

Ultrastable and Compact Deep UV Laser Source for Raman Spectroscopy, Phase I

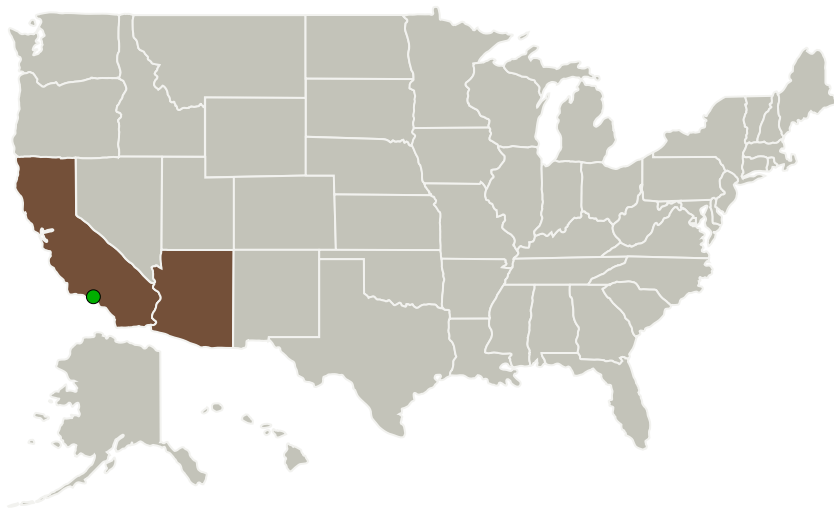
Completed Technology Project (2014 - 2014)



Project Introduction

Deep-ultraviolet (UV) Raman spectroscopy is a powerful method to collect chemically specific information about complex samples because deep-UV ($\lambda < 250$ nm) excitation shows an over 200-fold greater efficiency compared to commonly used 785 nm excitation and has the ability to avoid fluorescence background in the Raman spectra. The availability of compact, robust, and reliable deep-UV laser sources has been always considered a major bottleneck problem on implementing this spectroscopic technique for NASA's space-borne applications. TIPD proposes to develop an ultrastable, compact, and long-lived deep-UV laser source for Raman spectroscopy based on our substantial experiences and facilities in developing single-frequency fiber lasers and solid-state deep-UV laser sources. Cooperating with the University of Arizona, we will develop an ultrastable and compact high power single-frequency single-polarization fiber laser system at 976 nm. The deep-UV laser source at 244 nm will be generated through two successive frequency doubling systems. In this phase I program, we will demonstrate deep-UV generation through frequency quadrupling of a 976 nm single-frequency fiber laser. In phase II, a deep-UV laser prototype meeting all the criteria of NASA's applications will be developed.

Primary U.S. Work Locations and Key Partners



Ultrastable and Compact Deep UV Laser Source for Raman Spectroscopy Project Image

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Organizations Performing Work	Role	Type	Location
TIPD, LLC	Lead Organization	Industry	Tucson, Arizona
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California
University of Arizona	Supporting Organization	Academia	Tucson, Arizona

Primary U.S. Work Locations

Arizona	California
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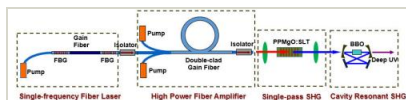
Project Transitions

**June 2014:** Project Start**December 2014:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140641>)

Images



Project Image

Ultrastable and Compact Deep UV Laser Source for Raman Spectroscopy Project Image
(<https://techport.nasa.gov/image/127889>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TIPD, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

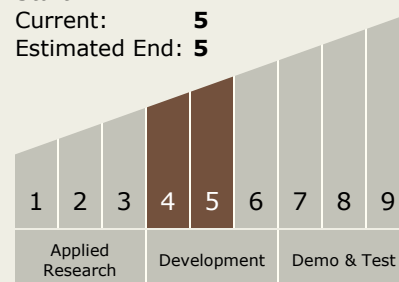
Carlos Torrez

Principal Investigator:

Valery Temyanko

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.5 Lasers

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System